

Appl. No. 09/994,294  
Amendment Dated May 10, 2004  
Reply to Office Action of Feb. 9, 2004

**REMARKS/ARGUMENTS**

Responsive to the Office Action, Applicant has canceled certain claims in this application and presents herewith amended Claims 1 and 11, in independent form. Amended Claims 3 and 10 are presented depending from amended Claim 1, together with new Claims 21 through 24.

Claims 12 and 16 remain in the application dependent on amended Claim 11 and new Claims 25 through 28 are presented dependent on Claim 11.

Claims 2, 4, 14 and 15 have been canceled.

Claims 5 through 9, 13 and 17 through 20 are withdrawn pursuant to the restriction requirement.

Consideration for allowance of the claims presented with this amendment is requested for the reasons set forth hereinbelow.

With respect to the objection to the drawings and the rejection of Claim 15 under 35 U.S.C. 112, the objection and rejection are believed to have been obviated by the cancellation of Claim 15.

In the Office Action, the Examiner rejected Claims 1 through 4, 11, 12, 14 and 15 under 35 U.S.C. 102(b) as being anticipated by the disclosure of US Patent 2,238,749 to Peltier. The Peltier reference discloses a fan propeller having four equally spaced blades and wherein two opposite blades are provided with plural irregularities in the form of spaced apart corrugations (20) or (27). In the embodiment of Figure 5, the other two blades of the fan are provided with a single protuberance or corrugation (28). It is clear from the drawings of the Peltier reference that the protuberances are somewhat streamlined and have leading edges which are faired into the plane of the blade surface. Contrary to the structure disclosed in the Peltier reference, Applicants' Claim 1, as amended, includes recitation (primarily from canceled Claim 4) of plural trips formed at or near the trailing edge of selected ones of the blades of a fan propeller on the pressure side surface of

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the blades, the trips including surfaces extending substantially normal to the pressure side surface of the blades to reduce tonal acoustic emissions generated by the fan propeller during rotation. In at least these respects Claim 1, as amended, is believed to distinguish patentably over the Peltier reference. Peltier speculates that the quiet operation of his fan results from the rhythmic airwaves produced by the blades as being different in pitch and character and therefore instead of being added together as would be the case in identical blades of conventional fans the so-called rhythmic airwaves produced by the blades are of different pitch and character and therefore may interfere and break each other thereby producing irregular air motions which do not travel far.

Contrary to the teaching and disclosure of Peltier, the trips provided on the pressure side surfaces of the fan blades of Applicants' invention interrupt a generally laminar boundary layer of air flowing over the blade surface more effectively than is contemplated by Peltier resulting in a reduction in sound pressure level while not affecting the structural integrity of the blades. Moreover, as shown in Applicants' drawing Figure 12 and as described in conjunction with Example 2, a substantial reduction in noise generated in the range of about 2,000 Hertz to 3150 Hertz was accomplished by providing trips of the type set forth in Claim 1. Accordingly, Claim 1 is believed to be directed to a patentably distinct combination which is not disclosed in or suggested by Peltier and consideration for allowance of Claim 1, as amended, is respectfully requested.

Claim 3 remains in the application dependent on Claim 1 and recites that the trips extend generally from the peripheral tip of the selected blades inwardly toward the hub along the trailing edge. These features together with the combination of features set forth in Claim 1 are also believed to not be anticipated by nor made obvious by the Peltier reference.

In the Office Action, the Examiner rejected Claim 10 under 35 U.S.C. 103 as being unpatentable over Peltier in view of US Patent 3,578,264 to Kuethe. Kuethe is directed to a technique for boundary layer control for the delay and displacement of flow separation and for the increase in the rate of heat exchange over a curved flow control surface such as an airfoil or the like. Kuethe describes structures which are intended to generate vortices in the boundary layer of fluid flowing over a surface and Kuethe suggests the provision of surface elements with amplitude, inclination to the flow direction and forms such as to amplify streamwise vortices in the boundary layer and adjacent flow regions with the objective of avoiding or delaying the inception of flow separation with minimum attendant energy loss, drag and noise generation.

However, Kuethe also suggests that the height of the elements described in conjunction with Figures 7A through 7E be, in each case, preferably less than the anticipated boundary layer thickness. On the contrary, Claim 10, and Claim 16 dependent on Claim 11, set forth that the height of the trips set forth in the respective parent claims is substantially equal to the boundary layer thickness and for a purpose other than generation of vortices. In fact, it is the intent of the trip features on the pressure side surfaces of the fan blades of Applicants' invention to prevent the formation and shedding of boundary layer vortices which are known to be noise producers. Accordingly, modifying the structure of Peltier as suggested by Kuethe would not produce the overall combination of features set forth in Claims 10 and 1 and 16 and 11, respectively, as now presented.

Applicants request reconsideration for allowance of Claim 11, as amended herein. Claim 11 has been amended to include the recitation of Claim 14 and to further recite that the trips formed at or near the trailing edge of selected ones of the fan blades are provided by plural spaced apart planar surfaces extending at an angle to the pressure side surfaces of the

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blades, respectively. In at least these respects Claim 11 is believed to distinguish patentably over the Peltier reference for the reasons set forth above in support of the patentability of amended Claim 1. Peltier fails to disclose or suggest boundary layer trips characterized by plural spaced apart planar surfaces extending at an angle to the pressure side of the propeller blades.

Claim 12 is believed to be patentable, in combination with the features set forth in parent Claim 11, for the reasons set forth above in support of Claim 3.

Claim 16 remains dependent on amended Claim 11 and is believed to be patentable for the reasons set forth above.

Applicants present with this amendment new Claims 21 through 24 depending from Claim 1, and Claims 25 through 28 depending from Claim 11. Claims 21 through 28 are believed to be necessary to fairly protect the invention set forth in Claims 1 and 11, respectively, and are believed to be patentably distinct taking into consideration the prior art of record in this application. Consideration for allowance of Claims 21 through 28 is also respectfully solicited.

Applicants have made a diligent effort to advance the prosecution of this application by canceling claims, by amending claims and by pointing out with particularity herein how the claims now presented distinguish in a patentable sense. An early Notice of Allowance of the claims currently pending in this application is respectfully solicited.

Respectfully submitted,

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